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POLYMORPHISM IN TWO SPECIES OF ALASKAN *BOLORIA* (NYMPHALIDAE)[1]

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In the interior regions of Alaska, the early summer of 1971 was extremely warm and dry. These weather conditions produced higher-than-normal-density flights of many butterfly species. This situation coupled with the fact that odd-numbered years produce heavier flights of certain species in the interior, permitted extensive collecting and observation of butterfly fauna.

It was noted, for certain species, that in a large series collected in a given locality, considerable variation in individuals occurred; more so than is the case in related species. This phenomena was observed in two species of *Boloria*, which is the subject of this paper, and in several of the Satyridae including *Oeneis jutta* (Hübner), *Erebia youngi* Holland, and in a large series of *Erebia rossii* (Curtis) collected along the Denali Highway from five miles west of Paxon to McKinley National Park. Examination of this material makes one question the validity of some of the subspecific names which have been applied to Alaskan populations of certain butterflies.

The species of *Boloria* reported on are *Boloria polaris* (Boisduval) and *Boloria chariclea butleri* (Edwards). Although several subspecies of *chariclea* have been described from the Far North, if a subspecific name is to be applied to the interior Alaska race, *butleri* appears appropriate.

Figure 1 illustrates six specimens of *Boloria polaris* collected on the tundra (above timberline) just below Eagle Summit (3800′) at mile 108.5 Steese Highway (approximately 110 miles N.E. of Fairbanks). Males are in the left column and females in the right column of the figure. The population at Eagle Summit

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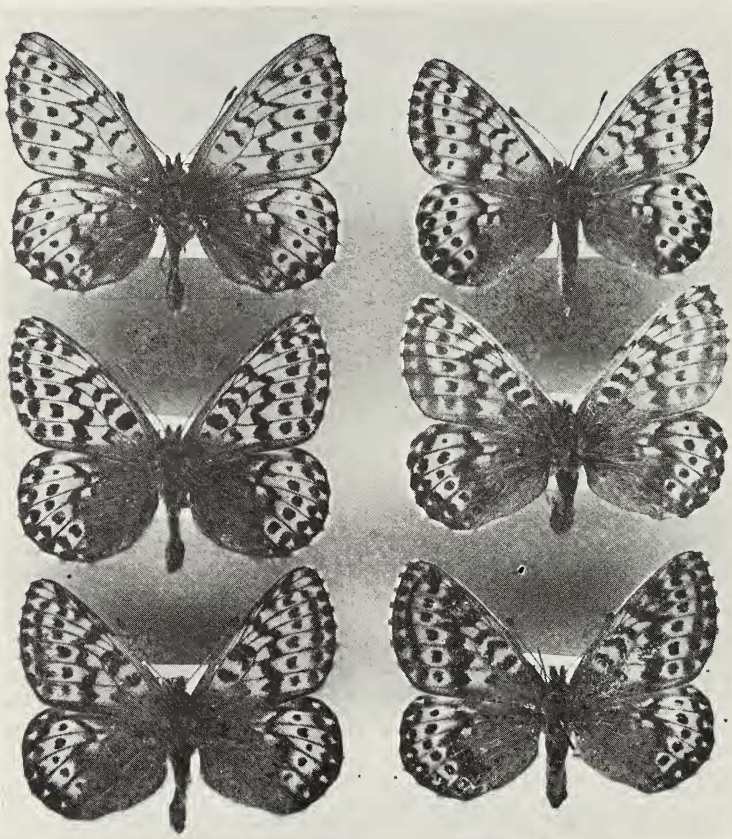

Fig. 1.—Variation in facies of *Boloria polaris* from Eagle Summit, Alaska.

is quite variable as the figure indicates. In general, the females are more heavily marked than the males and the general color of their wings is a deeper hue. In both sexes, maculation ranges from relatively light (almost penciling in some males) to quite heavy with general dark suffusion. The ground color of the males is essentially constant, while in the females it is rather variable. Some individuals tend toward a bluish or blue-green cast as in some of the females in the *Boloria napaea* (Hoffmansegg) races.

One-hundred specimens of *polaris* from various interior Alaska populations were examined in this study.

The variation in *Boloria chariclea* is even more pronounced than in *B. polaris* as is shown in Figure 2. Males are shown in the left column and at the bottom of the plate; females are in the right column. The specimens shown are all from a below-treeline meadow (2500′) along the Denali Highway at the eastern edge of McKinley National Park. The variation among the females is considerable. Typical examples are shown in the figure. The specimen shown in the upper right of the plate is an extreme example of the pale end of the variation. It was also noted that many females exhibit an opalescent sheen dorsally. The male shown at the bottom of the plate is probably an aberrant as only one specimen was taken with these markings.

Eight-six specimens of *chariclea* from various interior Alaska populations comprised this study.

It is difficult to explain the variation in maculation shown by these two species. In the Rocky Mountains, we frequently see variation of this nature in *Boloria* and other Nymphalidae as a function of altitude. In this study, however, altitude is not a variable. The *polaris* and *chariclea* shown in the plates are from fixed locations. The variation in altitude among the other localities where these *Boloria* were collected is a matter of only a few hundred feet.

Thermal adaptation also comes to mind, but this normally leads to dark and hirsute examples in cold regions, and pale examples in warm regions (E. Bursell in M. Rockstein, 1964). Dark coloration leads to infrared absorption and pale coloration to infrared reflectance. In the populations studied, we have the full range of variation from a fixed locality.

Annual rainfall, which is a pattern factor in arid region and tropical genera, probably can be ruled out, as rainfall is fairly constant in Alaska from year-to-year, and presumably the two species studied are from the same larval year.

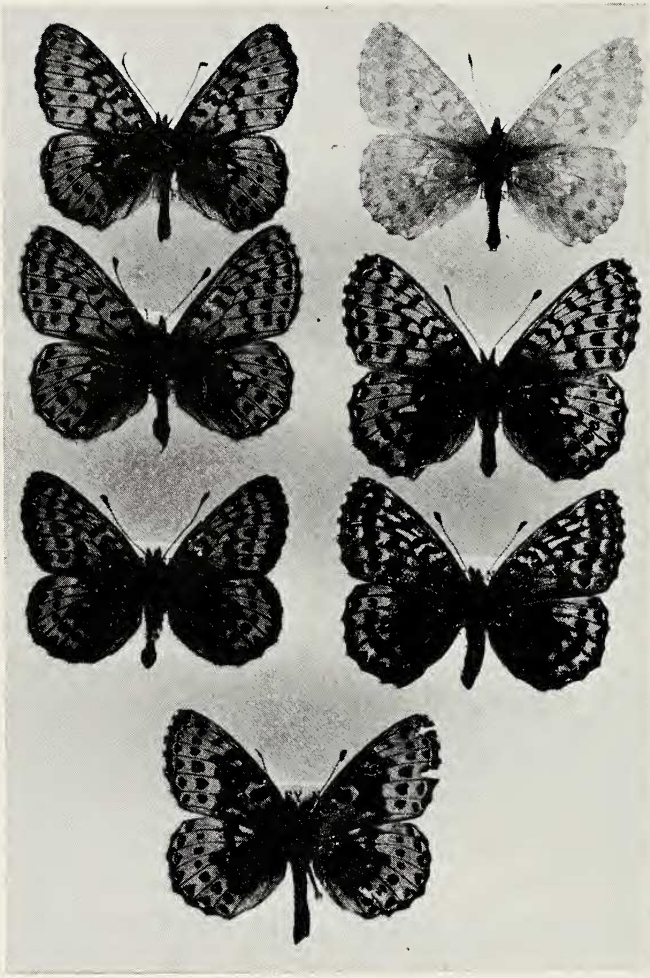

Fig. 2.—Variation in facies of *Boloria chariclea butleri* from the Alaska Range, Alaska.

Considerable temperature fluctuation does occur in the Alaskan interior and this is probably the cause of the observed variation. Melanic specimens and pattern deviations in butterflies frequently occur as a result of extreme temperature drops at the time of pupation. Thermal shock has been used by some collectors to produce pattern differences in reared specimens. In a one week period in June 1971, the author experienced air temperature changes from near 90° F to just above 32° F at constant altitude. During two days in the Alaska Range, snowfall occurred above treeline and rainfall below. The temperature drop was quite sudden (over the period of a few hours) as a storm front moved into the region. Since this type of sudden temperature change is common in the summer in the Far North, it may explain the variations in facies in given populations of certain species of butterflies. Since inclosion in butterflies takes place over a period of from 24 to 72 hours in many species, a severe temperature drop over a period of 8 hours might well affect the resultant imagoes. If this, in fact, is the cause of the observed pattern variation, then perhaps certain subspecific names should be re-evaluated. Many of the species from the Far North were described from one or a few specimens, as this was all of the material available at the time. Now that transportation into isolated regions is relatively easy, populations should be examined and nomenclature re-examined.

Some consideration was given to genetic factors and gene pools, but the author feels that these matters are probably not the major cause for the observed variability in the species examined. It is felt that genetic differences within a given population do play some role in the pattern deviations, but not the principal one.

ACKNOWLEDGMENT

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